

PETROGRAPHIC DESCRIPTIONPROJECT: Williamsport (12-78-7443)REQUEST: 101528FIELD NO: MAC-836AASN:ROCK NAME: ConglomerateGENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Carbonate Clasts	30	Pebble size; somewhat elongate; rounded features.	Some detritus present; fine sparitic texture; some recrystallization observed; some are micaceous.	
Quartz	30	Fine-grained; <u>subangular</u> to subrounded.	Mostly single grain variety; slight to moderate undulose extinction; some inclusions observed.	
Calcite Cement	29	Sparite.	Some forms large single crystals (determined by extinction); replaces some detrital material.	
Chlorite	3	Flakes of various size & shape.	Some contortion due to compaction; some anthigenic(?).	
Sedimentary RF	2	Pebble size; rounded.	Micaceous siltstone.	
Muscovite	2	Flakes of various size & shape.	Some contortion due to compaction.	

OTHER COMMENTS:

(Continued on next page)

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MAC-836

AASSN: (Cont.)

ROCK NAME:

GENERAL TEXTURE AND FEATURES:

MINERAL./COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Metamorphic RF	2	Subrounded; fine- to medium-grained.	Phyllites and fine-grained schists.	Breaking down-difficult to distinguish.
Opagues	1	Subangular to subrounded; fine-grained.	Interstitial.	
Chert	tr	Fine-grained; subrounded.	Typical microcrystalline texture.	
Plagioclase	tr	Fine-grained; subangular to subrounded.	Too small for accurate compositional determination.	Some replacement by calcite.
K-feldspar	tr	Fine-grained; subrounded.		
Biotite	tr	Flakes of various size & shape.	Some contortion due to compaction.	Altered; iron oxide development.
Zircon	tr	Subrounded; fine-grained.	Interstitial.	
Tourmaline	tr	Subrounded; fine-grained.	Interstitial; brown & green.	
Sphene	tr	Subangular; fine-grained.	Interstitial.	

OTHER COMMENTS: estimated porosity based on 400 points = 1%

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-006

AASSN:

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	62	Fine-grained; subangular.	Single grain types predominate; slight to moderate undulose extinction; secondary overgrowths observed (pre-depositional).	
Muscovite/sericite	19	Various sizes and shapes.	Some muscovite-rich layers.	
Metamorphic RF	7	Fine-grained; subrounded; elongate.	Phyllites.	Breaking down; difficult to distinguish.
Opagues	5	Various sizes and shapes.	Some secondary (?).	
Plagioclase	2	Fine-grained; subangular-subrounded.	Oligoclase-andesine; few inclusions.	Trace amounts of alteration.
K-feldspar	2	Fine-grained; subangular-subrounded.	Microcline and orthoclase; few inclusions.	Trace amounts of alteration.
Chlorite	2	Fine-grained; various shapes.	Both authigenic and detrital.	
Zircon	tr	Fine-grained; subrounded.	Disseminated.	
Tourmaline	tr	Fine-grained; subangular-subrounded.	Green varieties; disseminated.	

OTHER COMMENTS:

(Continued on next page)

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-006

AASSN: (Cont.)

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Apatite	tr	Fine-grained; subrounded.	Disseminated.	
Sphene	tr	Fine-grained; subrounded.	Disseminated.	Leucoxene development.

OTHER COMMENTS: estimated porosity based on 401 points = 4.73%

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-009

AASSN:

ROCK NAME: Conglomerate

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Carbonate Clasts	68	Pebble size; subrounded to rounded; some are elongate.	Mostly micritic; some detrital minerals and secondary opaques; some recrystallization to sparite.	
Calcite Cement	12	Sparitic.	Replaces some feldspar.	
Quartz	10	Fine-grained; mostly subrounded.	Single grain types predominate; some vein quartz with vermicular chlorite inclusions present.	Some secondary overgrowths observed (pre-depositional).
Muscovite	4	Flakes of various sizes & shapes.	Disseminated.	
Rock Fragments	3	Fine to medium-grained; subrounded to rounded; some elongate.	Schists, phyllites, shales.	Breaking down - difficult to distinguish.
Chlorite	1	Flakes of various sizes & shapes.	Disseminated.	
Opagues	1	Various sizes & shapes.	Disseminated.	

OTHER COMMENTS:

(Continued on next page)

FLUOROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-009

AASSN: (Cont.)

ROCK NAME:

GENERAL TEXTURE AND FEATURES:

<u>MINERAL/COMPONENT</u>	<u>%</u>	<u>TEXTURE</u>	<u>CHARACTERISTICS</u>	<u>ALTERATION/REPLACEMENT</u>
K-feldspar	tr	Fine-grained; subrounded.	Microcline and orthoclase; few inclusions.	Some replacement by calcite; trace alteration.
Plagioclase	tr	Fine-grained; subrounded.	Oligoclase; few inclusions.	Some replacement by calcite; trace alteration.
Tourmaline	tr	Fine-grained; subangular-subrounded.	Green; disseminated.	
Biotite	tr	Flakes of various size and shape.	Disseminated.	
Sphene	tr	Fine-grained; subrounded.	Disseminated.	Leucozene development.
Zircon	tr	Fine-grained; subrounded.	Disseminated.	
Chert	tr	Fine-grained; rounded.	Typical microcrystalline texture.	

OTHER COMMENTS: estimated porosity based on 475 points = 0.63%

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-013

AASSN:

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	64	Fine-grained; subangular-subrounded.	Single, polycrystalline, stretched and recrystallized metamorphic types present; some secondary overgrowths observed.	
Muscovite/sericite	20	Flakes of various size & shape.	Sericite as matrix disseminated; defines bedding.	
Metamorphic RF	7	Fine-grained; subrounded; elongate.	Phyllites.	Breaking down; difficult to distinguish.
Opaques	3	Various shapes & sizes.	Locally as secondary cement; also detrital; iron oxides as staining.	
Chlorite	3	Flakes of various size & shape.	Detrital & anthigenic; disseminated.	
Plagioclase	1	Fine-grained; subangular-subrounded.	Composition could not be accurately determined; few inclusions.	Trace alteration.
K-feldspar	1	Fine-grained; subangular-subrounded.	Microcline and orthoclase.	Trace alteration.

OTHER COMMENTS:

(Continued on next page)

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO.: MHK-013

AASSN: (Cont.)

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES:

<u>MINERAL/COMPONENT</u>	<u>%</u>	<u>TEXTURE</u>	<u>CHARACTERISTICS</u>	<u>ALTERATION/REPLACEMENT</u>
Tourmaline	tr	Fine-grained; subangular-subrounded.	Green; disseminated.	
Biotite	tr	Flakes of various size and shape.	Disseminated.	
Zircon	tr	Fine-grained; subrounded.	Disseminated.	
Sphene	tr	Fine-grained; subrounded.	Disseminated.	

OTHER COMMENTS: estimated porosity based on 400 points = 2.5%

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-016

AASSN:

ROCK NAME: Calcareous lithic arenite

GENERAL TEXTURE AND FEATURES:

6-9

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	50	Fine-grained; subangular-subrounded.	Single grain type predominates; some vein, polycrystalline, stretched & recrystallized metamorphic types present.	Some secondary overgrowths observed (pre-depositional).
Calcite Cement	21	Sparitic	Replaces some feldspar.	
Carbonate Clasts	12	Pebble size; subrounded-rounded; elongate.	Some iron staining; micritic; some recrystallization to sparite.	
Metamorphic RF	5	Fine-grained; rounded; elongate.	Phyllites & schists.	Decomposing - breaking down; difficult to distinguish.
Plagioclase	2	Fine-grained; subangular - subrounded.	Oligoclase; few inclusions.	Some replacement by calcite; minor-moderate alteration.
Muscovite	2	Flakes of various size & shape.	Disseminated; some iron oxide along cleavage.	
Opaques	3	Fine-grained; subangular-rounded.	Disseminated.	

OTHER COMMENTS:

(Continued on next page)

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-016

AASSN: (Cont.)

ROCK NAME:

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Chlorite	2	Flakes of various size & shape.	Detrital and anthigenic; disseminated.	
K-feldspar	1	Fine-grained; subangular-subrounded.	Microcline and orthoclase; few inclusions.	Some replacement by calcite; minor alteration.
Chert	tr	Fine-grained; subrounded to rounded.	Typical microcrystalline texture.	
Zircon	tr	Fine-grained; subrounded.	Disseminated.	
Tourmaline	tr	Subangular to subrounded; fine-grained.	Green; disseminated.	
Sphene	tr	Fine-grained; subangular-subrounded.	Disseminated.	Leucoxene development.

D-10

OTHER COMMENTS: estimated porosity based on 400 points = 2.75%

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-021

AASSN:

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	65	Fine-grained; subangular-subrounded.	Predepositional overgrowths observed; single grain type dominant; some polycrystalline, stretched, recrystallized metamorphic types present.	
Muscovite/sericite	18	Flakes of various size & shape.	Sericite as "matrix" disseminated.	
Opagues	6	Various sizes and shapes.	Detrital & locally as secondary cement.	
Metamorphic RF	6	Fine-grained; elongate; rounded.	Phyllites.	Breaking down; difficult to distinguish.
Plagioclase	2	Fine-grained; subangular-subrounded.	Accurate composition could not be determined.	Minor to moderate alteration.
K-feldspar	1	Fine-grained; subangular-subrounded.	Microcline and orthoclase.	Minor alteration.
Chlorite	1	Flakes of various size & shape.	Disseminated.	
Tourmaline	tr	Fine-grained; subangular-subrounded.	Disseminated.	

OTHER COMMENTS:

(Continued on next page)

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-021

AASSN: (Cont.)

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES:

<u>MINERAL/COMPONENT</u>	<u>%</u>	<u>TEXTURE</u>	<u>CHARACTERISTICS</u>	<u>ALTERATION/REPLACEMENT</u>
Biotite	tr	Flakes of various size & shape.	Disseminated.	
Zircon	tr	Fine-grained; subangular-subrounded.	Disseminated.	
Sphene	tr	Fine-grained; subangular-subrounded.	Disseminated.	

D-12

OTHER COMMENTS: estimated porosity based on 400 points= 2.25%

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-022

AASSN:

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	66	Fine-grained; subangular-subrounded.	Secondary overgrowths are common; single grain type dominant; polycrystalline, stretched, and recrystallized metamorphic types also present.	
Muscovite/sericite	16	Flakes of various size & shape.	Sericite as "matrix" disseminated.	Opagues along some cleavage.
Opagues	7	Various sizes & shapes.	Locally as cement; also detrital.	
Metamorphic RF	5	Fine-grained; rounded; elongate.	Phyllites, schists.	Breaking down; difficult to distinguish.
Plagioclase	2	Fine-grained; subangular-subrounded.	Composition could not be determined.	Minor alteration.
K-feldspar	1	Fine-grained; subangular-subrounded.	Microcline and orthoclase; few inclusions.	Trace alteration.
Chlorite	1	Flakes of various size & shape.	Detrital and anthigenic; disseminated.	

OTHER COMMENTS:

(Continued on next page)

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-022

AASSN: (Cont.)

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Biotite	1	Flakes of various size & shape.	Disseminated.	
Zircon	tr	Fine-grained; subrounded.	Disseminated.	
Sphene	tr	Fine-grained; subrounded.	Disseminated.	Leucoxene development.
Tourmaline	tr	Fine-grained; subangular - subrounded.	Disseminated.	

D-14

OTHER COMMENTS: estimated porosity based on 400 points= 1.5%

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MUK-045

AASSN:

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	60	Subangular to subrounded; fine-grained.	Mostly single grains with moderate to strong undulose extinction; some heavily rutilated; polycrystalline types are present.	Trace of secondary quartz overgrowths as a result of pressure solution.
Plagioclase	3	Subangular to subrounded; fine-grained.	No accurate compositional determination could be made.	Minor to moderate alteration.
K-feldspar	2	Subangular to subrounded; fine-grained.	Microcline and orthoclase.	Minor alteration.
Metamorphic RF's	5	Subrounded & elongate; fine-grained.	Fine-grained schists & phyllites; compaction & grain contacts make them difficult to distinguish; breaking down to form "matrix".	
Matrix	11		Micaceous, chloritic, and siliceous in areas; derived from metamorphic RF's and secondary quartz.	

OTHER COMMENTS:

(Continued on next page)

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-045

AASSN: (Cont.)

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Muscovite/sericite	10	Flakes of various size & shape.	Large flakes show contortion features as a result of compaction.	
Biotite	3	Flakes of various size & shape.	Large flakes show contortion feature as a result of compaction.	Some alteration to chlorite.
Chlorite	5	Flakes of various size & shape.	Detrital and anthigenic.	
Tourmaline	tr	Subangular; fine-grained.	Disseminated in sample.	
Zircon	tr	Subangular to subrounded; fine-grained.	Disseminated in sample.	
Opagues	tr	Various sizes and shapes.	Hematite and traces of pyrite.	

OTHER COMMENTS: Estimated porosity based on 410 points = 4.7%

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-050

AASN:

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	70	Subangular to subrounded; fine-grained.	Mostly single grain type; some polycrystalline; some grains are heavily rutilated; moderate undulose extinction.	Trace of secondary quartz overgrowths.
Plagioclase	2	Subangular to subrounded; fine-grained.	Too fine for accurate compo- sitional determination.	Minor to moderate alteration.
K-feldspar	3	Subangular to subrounded; fine- grained.	Microcline and orthoclase.	Minor to moderate alteration.
Muscovite	7	Flakes of various size & shape.	Contorted due to compaction.	
Chlorite	4	Flakes of various size & shape.	Detrital & authigenic; contorted due to compaction.	
Metamorphic RF's	5	Fine-grained; elongate; subrounded.	Fine-grained micaceous schists & phyllites; breaking down to form matrix.	
Chert	tr	Fine-grained; subrounded.	Typical microcrystalline texture.	

OTHER COMMENTS:

(Continued on next page)

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-050

AASSN: (Cont.)

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Matrix	7		Micaceous & chloritic; from breakdown of metamorphic RF's.	
Tourmaline	tr	Fine-grained; subangular.	Disseminated in sample.	
Apatite	tr	Fine-grained; subangular.	Disseminated in sample.	
Zircon	tr	Fine-grained; subrounded.	Disseminated in sample.	
Opaques	1	Copper minerals in one mass; hematite is disseminated.	Chalcocite & covellite; hematite.	
Malachite	tr		With chalcocite & covellite.	

OTHER COMMENTS:

Estimated porosity based on 415 points = 5.54%

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-069

AASSN:

ROCK NAME: Micaceous Quartz Wacke

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	58	Subangular-subrounded; fine- to very fine-grained.	Mostly single grain form; some polycrystalline; abundant rutile in a few; moderate to strong undulose extinction.	
Matrix	17		Mixture of sericite & chlorite; derived from unstable fine-grained metamorphic rock fragments.	
K-feldspar	2	Subangular-subrounded; fine- to very fine-grained.	Microcline & orthoclase.	Minor alteration.
Plagioclase	2	Subangular-subrounded; fine- to very fine-grained.	Too small for compositional determination.	Minor alteration.
Metamorphic RF's	3	Subrounded; elongate; fine-grained.	Fine-grained schists & phyl-lites; breaking down to form matrix; difficult to distinguish between matrix and rock fragments.	

OTHER COMMENTS:

(Continued on next page)

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-069

AASSN: (Cont.)

ROCK NAME: Micaceous Quartz Wacke

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Muscovite	8	Flakes of various size & shape.	Detrital & anthigenic (sericite); contorted due to compaction.	
Chlorite	8	Flakes of various size & shape.	Detrital & anthigenic; contorted due to compaction.	
Opaques	1	Various sized & shapes.	Detrital iron oxides and organics (?).	
Tourmaline	tr	Very fine-grained; subangular.	Disseminated in sample.	
Zircon	tr	Very fine-grained; subangular-subrounded.	Disseminated in sample.	

OTHER COMMENTS: Estimated porosity based on 400 points = 1.25%

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-082

AASSN:

ROCK NAME: Lithic Wacke

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	42	Subangular to subrounded; fine-grained.	Mostly single grain type with moderate undulose extinction.	Trace of secondary quartz overgrowths.
Plagioclase	3	Subangular to subrounded; fine-grained.	Too fine for accurate compositional determination.	Minor alteration.
K-feldspar	2	Subangular to subrounded; fine-grained.	Microcline and orthoclase.	Minor alteration.
Matrix	17		Micaceous & chloritic; minor calcite.	
Rock fragments	25	Sedimentary RF's - pebble sized. Metamorphic RF's - fine-grained.	SRF's -- carbonate (micrite) clasts and sandy carbonates; opaques present. MRF's -- fine-grained schists phyllites.	Some recrystallization of micrite to sparite.
Chlorite	2	Flakes of various size & shape.	Anthigenic & detrital; contorted.	
Muscovite/sericite	3	Flakes of various size & shape.	Detrital; contorted.	

OTHER COMMENTS:

(Continued on next page)

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-082

AASSN: (Cont.)

ROCK NAME: Lithic Wacke

GENERAL TEXTURE AND FEATURES:

<u>MINERAL/COMPONENT</u>	<u>%</u>	<u>TEXTURE</u>	<u>CHARACTERISTICS</u>	<u>ALTERATION/REPLACEMENT</u>
Tourmaline	tr	Subangular to subrounded; fine-grained.	Disseminated in sample.	
Opagues	4	Various sizes & shapes; most in a vein.	Covellite, chalcocite, chalcopyrite, pyrite, limonite.	
Zircon	tr	Subrounded; fine-grained.	Disseminated in sample.	
Malachite	1		With opaque copper minerals and with calcite in micrite clasts; also as local cement.	
Brannerite	tr		Detrital.	

OTHER COMMENTS: Estimated porosity based on 400 points = 1.0%

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-091

AASSN:

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES: Compaction features obscure grain relationships; concave/convex contacts common; more rock fragments may be present, but obscured.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	67	Subangular-subrounded; fine- to very fine-grained.	Single grain form most common; slight to strong undulose extinction; abundant rutile in some.	Some secondary quartz overgrowths observed; a result of pressure solution.
Muscovite/sericite	6	Flakes of various size & shape.	Detrital & secondary; detrital shows compaction effects.	
Calcite cement	10	Sparitic.	Patchy; as local cement.	
K-feldspar	2	Subangular-subrounded; fine- to very fine-grained.	Microcline & orthoclase.	Fresh.
Chlorite	4	Flakes of various size & shape; also as pore space filler.	Both detrital & secondary are present; detrital shows compaction effects; suspect some to be altered biotite.	
Metamorphic RF's	2	Subrounded; somewhat elongate; fine-grained.	Fine-grained schists & phyllites; difficult to distinguish in thin section; breaking down to from matrix.	

OTHER COMMENTS:

(Continued on next page)

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-091

AASSN: (Cont.)

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Plagioclase	2	Subangular-subrounded; fine- to very fine-grained.	Too small for accurate compositional determination.	Trace amounts of alteration.
Barite Cement	tr	Sparitic.	Patchy; as local cement.	
Matrix	6		Sericitic & chloritic; derived from breakdown of unstable fine-grained metamorphic rock fragments.	
Opagues	tr	Fine- to very fine-grained; subangular.	Disseminated in sample.	
Apatite	tr	Fine- to very fine-grained; subangular.	Disseminated in sample.	
Zircon	tr	Fine- to very fine-grained; subrounded.	Disseminated in sample.	
Tourmaline	tr	Fine- to very fine-grained; subrounded.	Disseminated in sample.	
Chalcedony	tr	Fine-grained; subangular.	One grain observed.	

OTHER COMMENTS: Estimated porosity based on 400 points = 0.75%

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-102

AASN:

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES: Grain boundaries difficult to observe due to compaction and pressure solution; could be more rock fragments and more polycrystalline quartz than noted.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	73	Subangular to subrounded; fine-to very fine-grained.	Mostly single grain; moderate undulose extinction; abundant rutile inclusions in some.	Some secondary quartz overgrowths as a result of pressure solution are present.
Plagioclase	4	Subangular to subrounded; fine-to very fine-grained.	Oligoclase-andesine by Michel-Lévy's method; untwinned plagioclase also present.	Only trace amounts of alteration.
K-feldspar	3	Subangular to subrounded; fine-to very fine-grained.	Orthoclase and microcline.	Trace amounts of alteration.
Muscovite/sericite	4	Flakes of various size & shape.	Detrital & anthigenic; shows compaction features.	
Chlorite	4	Flakes of various size & shape; also as pore space filler.	Both detrital flakes & anthigenic; some as alteration of biotite; detrital shows compaction features.	
Metamorphic RF's	2	Subrounded; somewhat elongate; fine-grained.	Fine-grained schists and phyllites, breaking down to form matrix; difficult to distinguish.	

OTHER COMMENTS:

(Continued on next page)

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport (12-78-7443)

REQUEST: 101528

FIELD NO: MHK-102

AASN: (Cont.)

ROCK NAME: Micaceous Quartz Arenite

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Matrix	8		Micaceous/sericitic; derived from fine-grain metamorphic rock fragments.	
Opauques	1	Various sized & shapes.	Some organics (?); detrital grains are disseminated.	
Apatite	tr	Subangular; fine- to very fine-grained.	Disseminated in sample.	
Sphene	tr	Subangular; fine- to very fine-grained.	Disseminated in sample.	
Zircon	tr	Subangular-subrounded; fine-grained.	Disseminated in sample.	
Tourmaline	tr	Subangular; fine-grained.	Brown; disseminated.	
Chert	tr	Subangular-subrounded; fine-grained.	Detrital; typical microcrystalline texture.	
Barite	tr		As local cement.	

OTHER COMMENTS: Estimated porosity based on 400 points = 3.25%

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-115 AASSN:

ROCK NAME: Quartz Arenite

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES: Point and straight grain to grain contacts predominate; siliceous zones contain more iron oxide than carbonate cemented zones; void space estimated to be less than 1%; alpha tracking of polished thin section of this sample for 30 days revealed no significant radioactive sources.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	71	Mostly fine to medium sand sized; mostly subrounded with relatively smooth surface features (oxides & cements obscure features).	Mostly single grain variety; some polycrystalline forms are present; inclusions of vermicular chlorite (in vein quartz) and rutile were observed; where cemented by quartz, well preserved dust rings (iron oxides) are present; weak to strong undulose extinction noted.	
Sedimentary Rock Fragments	1	A few coarse sand sized carbonate clasts; majority are medium to fine sand sized; elongate; subrounded.	Silt stones, mudstones, and carbonate clasts.	Some deformation to matrix from compaction.
Metamorphic Rock Fragments	3	Mostly medium sand sized; elongate; subrounded.	Fine grained quartz-mica schists and phyllites.	Some deformation to matrix from compaction.
Silica Cement	8		As well developed secondary overgrowths which are in optical continuity; probably released by pressure solution; some quartz crystal growth; post-dates iron staining and precedes carbonate cementation.	

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PETROGRAPHIC DESCRIPTION - Continued

PROJECT: Williamsport
12-78-7443
ROCK NAME: Quartz Arenite

REQUEST: 101703

FIELD NO: MHK-115 AASSN:

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Carbonate Cement	8	Sparitic.	Patchy; well crystallized; replaces feldspars to a minor extent; iron stained in some areas.	
Plagioclase	<1	Mostly fine to very fine sand sized; subangular to sub-rounded.	Accurate compositional determination could not be made; some could be part of rock fragments but are difficult to recognize.	Minor to moderate replacement by carbonate; minor to moderate alteration.
K-feldspar	<1	Mostly fine to very fine sand sized; subangular to sub-rounded.	Orthoclase & microcline; some well developed authigenic K-feldspar overgrowths; some could be part of rock fragment but difficult to recognize.	Minor to moderate replacement by carbonate; minor to moderate alteration.
Muscovite	<1	Flakes of various size & shape.	Contorted due to sediment compaction; some iron oxide staining.	Some iron oxides along cleavage.
Biotite	<1	Flakes of various size & shape.	Contorted due to sediment compaction.	Moderate to extensive alteration; some iron oxide development along cleavage traces.
Chlorite	<1	Flakes of various size & shape.	Some identified as detrital penninite; also deformed due to compaction; no authigenic forms clearly recognized.	

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PETROGRAPHIC DESCRIPTION - Continued

PROJECT: Williamsport
 12-78-7443
 ROCK NAME: Quartz Arenite

REQUEST: 101703

FIELD NO: MHK-115 AASSN:
 PETROLOGIST:

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Chert	<1	Fine sand sized; subangular to subrounded.	Typical microcrystalline texture.	
Barite Cement	<1		Patchy; very localized;	
Tourmaline	<1	Very fine sand to coarse silt sized; subrounded.	Disseminated throughout sample.	
Zircon	<1	Very fine sand to coarse silt sized; subrounded.	Disseminated throughout sample.	
Rutile	<1	Very fine sand sized; subangular.	One detrital grain observed in this thin section.	
Opauques	3	Various forms.	Hematite and limonite; hematite as grains and forming along cleavage traces in micas; limonite as staining.	
Sphene	<1	Very fine sand sized.	Disseminated throughout sample.	Extensive leucoxene development.
Apatite	<1	Very fine sand sized; subrounded.	Disseminated throughout sample.	

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport 12-78-7443 REQUEST: 101703

FIELD NO: MHK-121 AASN:

ROCK NAME: Micaceous Quartz Gacke

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES: Abundant micaceous minerals obscure grain to grain relationships between non-micaceous minerals but point and straight contacts seem to prevail; difficult to establish where rock fragments end and "matrix" begins; present void space is estimated to be less than 1.5%; alpha tracks were attributed to barite.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	63	Fine-to medium sand sized; subangular shapes predominate but subrounded to rounded grains are also present.	Mostly single grain variety; some polycrystalline forms present (metamorphic); a few grains are heavily rutilated; various other inclusions observed; grain borders appear to be smooth.	Iron oxide staining of rims is fairly common; trace of secondary quartz overgrowths.
Metamorphic Rock Fragments	5	Mostly medium sand sized; elongate; subrounded.	Mica schists & phyllites; unstable; breaking down in place to form matrix.	
Sedimentary Rock Fragments	1	Medium sand sized; elongate; subrounded.	Mudstones; breaking down to form matrix.	
Plagioclase	<1	Mostly fine sand sized; subangular to subrounded.	Too small for accurate compositional determination; some could be part of rock fragments but too difficult to distinguish.	Most are relatively fresh in appearance; a few show moderate argillic alteration.
K-feldspar	<1	Mostly fine sand sized; subangular to subrounded.	Microcline and orthoclase; some inclusions present; some could be part of rock fragments but difficult to distinguish; trace of authigenic overgrowths.	Minor to moderate argillic alteration.

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport 12-78-7443 REQUEST: 101703 FIELD NO: MHK-121 AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Biotite	3	Flakes of various size & shape.	Some larger flakes are contorted due to sediment compaction.	Various degrees of alteration; some iron oxide development along cleavage traces.
Muscovite	5	Flakes of various size & shape.	Contorted due to sediment compaction; good indicator of bedding planes.	Some iron oxide development along cleavage traces.
Chlorite	4	Flakes of various size & shape.	Mostly detrital; some authigenic (?); opaque inclusions fairly common.	
Malachite	2		As a secondary cement and grain coating; in patchy areas.	
Chert	<1	Fine sand sized; subrounded.	Typical microcrystalline texture.	
Calcite Cement	<1		Patchy; very localized.	Iron stained.
Barite Cement	<1		Patchy; very localized.	
Matrix	12		Clayey & micaceous; from breakdown of unstable rock fragments.	
Sphene/Rutile	<1	Very fine sand to coarse silt sized; subrounded.	Disseminated throughout sample.	Extensive leucoxene development.

OTHER COMMENTS:

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport 12-78-7443

REQUEST: 101703

FIELD NO: MHK-121

AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Tourmaline	<1	Very fine sand to coarse silt sized; subrounded.	Disseminated throughout sample.	
Apatite	<1	Very fine sand to coarse silt sized; subrounded.	Disseminated throughout sample.	
Opagues	2	Various shapes & sizes.	Cu-S-As & Pb-S-As minerals, galena, hematite, limonite, chalcopryite, and carbonaceous matter.	

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OTHER COMMENTS:

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport 12-78-7443

REQUEST: 101703

FIELD NO.: MHK-130

AASSN:

ROCK NAME: Calcareous Quartz Arenite

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES: Floating, point, and straight grain to grain contacts observed; present void space is estimated to be less than 1%.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	63	Mostly fine to very fine sand sized; some medium sand sized grains are also present; subangular to subrounded.	Single grain variety of quartz dominates; some polycrystalline (metamorphic) grains are present; various inclusions observed; calcite obscures most grain boundaries, but they do appear smooth.	Some iron staining present.
Metamorphic Rock Fragments	3	Fine to medium sand sized; elongate; subrounded.	Micaceous schists & phyllites; unstable; breaking down to form matrix.	
Sedimentary Rock Fragments	3	Fine sand sized; subrounded.	Mudstones & claystones; breaking down to form matrix.	
Calcite Cement	19		Sparitic; forms some large continuous crystals in some areas; replaces feldspar to a minor extent.	
Barite Cement	<1		Patchy; in small local areas.	
Chert	<1	Fine sand sized; subrounded.	Typical microcrystalline texture.	
Plagioclase	<1	Fine to very fine sand sized; subangular to subrounded.	Too small for accurate compositional determination; some inclusions present.	Relatively fresh; trace of replacement by calcite.

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport 12-78-7443

REQUEST: 101703

FIELD NO: MHK-130 AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
K-feldspar	<1	Fine to very fine sand sized; subangular to subrounded.	Orthoclase; some small inclusions present.	Minor alteration; trace of replacement by calcite.
Matrix	3		Clayey and micaceous; from breakdown of unstable rock fragments.	
Muscovite	3	Flakes of various size & shape.	Some contortion due to sediment compaction.	Some iron oxide development along cleavage traces.
Biotite	<1	Flakes of various size & shape.	Some contortion; a few flakes are heavily rutilated.	
Chlorite	1	Flakes of various size & shape.	Some contort'on due to compaction; some authigenic (?).	
Zircon	<1	Very fine sand to coarse silt sized; subrounded to rounded.	Most is concentrated in layers with other heavy minerals; also disseminated.	
Tourmaline	<1	Fine sand to coarse silt sized; smaller ones tend to occur in heavy mineral layers; sub-rounded.	Mostly concentrated in layers with other heavy minerals; also disseminated.	
Sphene/Rutile	<1	Very fine sand to coarse silt sized; subrounded.	Most is concentrated in layers with other heavy minerals; also disseminated.	Abundant leucoxene development.

OTHER COMMENTS:

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport 12-78-7443

REQUEST: 101703

FIELD NO: MHK-130

AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Opagues	2		Detrital "brannerite" with a leucoxene rim (see photo); trace chalcopryrite observed; trace limonite; most is leucoxene on rutile(?) carbonaceous matter also present.	

OTHER COMMENTS:

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport
12-78-7443

REQUEST: 102332

FIELD NO: MHK-150 AASN:

ROCK NAME: Calcareous Lithic Arenite

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES: Approximately 2½% pore space by point count.

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MINERAL/COMPONENT	X	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	64	Fine sand to granule sized; poorly sorted; concave/convex grain contacts common; subangular to subrounded original shapes.	Single, polycrystalline, stretched metamorphic, recrystallized metamorphic and vein quartz with vermicular chlorite are present; various inclusions present.	Secondary quartz overgrowths as a result of silica liberation during pressure solution are present.
Calcite Cement	15		Sparitic; twinning common; replaces portions of some feldspar grains.	
Chlorite	1	Flakes of various size & shape.	Compaction deformation observed; disseminated detrital flakes.	Some are iron stained.
Plagioclase	2	Medium to coarse sand sized; subangular to subrounded.	Twin lamellae show minor distortion; abundant micas in some; some could be part of RF's but contacts make positive distinction difficult.	Minor to moderate alteration; iron oxide stained; some replacement by calcite.
K-feldspar	3	Medium to coarse sand sized; subangular to subrounded.	Microcline & perthite, could be part of RF's but contacts make positive distinction difficult.	Minor to moderate alteration; iron oxide stained; some replacement by calcite.
Biotite	< 1	Flakes of various size & shape.	Compaction deformation observed; disseminated detrital flakes.	Some alteration to chlorite; iron stained in areas.
Muscovite	1	Flakes of various size & shape.	Compaction deformation observed; disseminated detrital flakes.	

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport
12-78-7443

REQUEST: 102332

FIELD NO: MHK-150 AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Zircon	tr	Very fine to fine sand sized; subangular to subrounded.	As inclusions & disseminated detrital grains.	
Metamorphic RF's	5	Medium sand to granule sized; somewhat elongate; subrounded features.	Phyllites, schists, & "gneissic" rock fragment; cataclastic textures ob- served; quartzite fragments also present, but counted as quartz.	
Malachite	<1		As local pore space filling; patchy.	
Uranophane	<1		As secondary pore space filling; some Ti oxides associated.	
Sedimentary RF's	5	Very elongate (flat) clasts; pebble sized to medium sand sized.	Mudstones (some silty) & shale clasts; compaction deformation is obvious; beginning to form "matrix".	
Rutile	tr	Very fine sand sized; subangular.	As inclusions & disseminated detrital grains.	
Opaques	2	Various forms.	Carbonaceous matter; limonite, hematite, & abundant leucoxene coated grains.	
Sphene	tr	Silt sized; subangular.	Disseminated detrital grains.	
Authigenic Clay	tr		In pore spaces,	

OTHER COMMENTS:

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-153 AASSN:

ROCK NAME: Lithic Wacke

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES: Point and straight grain to grain contacts predominate although concave/convex contacts are also present; present porosity estimated to be approximately 4%.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	57	Mostly medium sand sized; appears to be poorly sorted overall; mostly subangular to subrounded; fairly smooth grain boundaries.	Single, polycrystalline, stretched metamorphic, recrystallized metamorphic and vein quartz varieties all observed; various inclusions present.	
Chert	<1	Medium sand sized; subrounded.	Typical microcrystalline texture.	
Metamorphic Rock Fragments	4	Mostly medium sand sized; elongate; subrounded features.	Micaceous quartz schists and phyllites; breaking down.	
Chlorite	<1	Flakes of various size & shape.	Contorted due to sediment compaction.	
Biotite	2	Flakes of various size & shape.	Contorted due to sediment compaction.	Moderate to extensive alteration; probably releasing iron oxides; iron oxides along cleavage traces.
Muscovite	2	Flakes of various size & shape.	Contorted due to sediment compaction.	Iron oxide development along cleavage traces.
Zircon, Spene, Rutile	<1	Fine sand sized; subrounded.	Disseminated throughout sample.	
Tourmaline	<1	Fine sand sized; subrounded.	Disseminated throughout sample.	

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport 12-78-7443

REQUEST: 101703

FIELD NO: MHK-153

AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
K-feldspar	41	Medium sand sized; subrounded.	Orthoclase; some inclusions.	Moderate alteration.
Opques	14	Various forms.	Hematite, limonite, organics; organics in layers & cut by hematite.	
Matrix	13		Derived from breakdown of unstable rock fragments.	
Sedimentary Rock Fragments	5	Very coarse sand sized; elongate.	Mudstones; contorted due to sediment compaction.	

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OTHER COMMENTS:

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-157 AASSN:

ROCK NAME: Micaceous Quartz Wacke

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES: Point and straight contacts for non-micaceous & non-fragment components; present porosity estimated to be approximately 1%.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	59	Mostly fine sand sized; smaller and larger grains also present; subangular, some subrounded; fairly smooth grain borders.	Mostly single grain variety; some polycrystalline (metamorphic) grains are present; various inclusions observed.	Traces of secondary quartz overgrowths; predepositional.
Matrix	21		Clayey & micaceous; derived from breakdown of unstable rock fragments.	
Metamorphic Rock Fragments	6	Mostly fine sand sized; elongate; subrounded.	Micaceous quartz schists & phyllites; breaking down to form matrix difficult at times to distinguish rock fragments from matrix.	
Plagioclase	1	Fine sand sized; subangular, some subrounded.	No compositional determination could be made; some could be part of rock fragments (can't be sure).	Minor amounts of alteration.
K-feldspar	<1	Fine sand sized; subrounded.	Microcline and orthoclase; various inclusions observed; some could be part of rock fragments (can't be sure).	Minor amounts of alteration.
Chert	<1	Fine sand sized; subrounded.	Typical microcrystalline texture.	
Biotite	2	Flakes of various size & shape.	Some contortion of larger flakes due to sediment compaction.	Various degrees of alteration; abundant iron oxide development in some grains.

PETROGRAPHIC DESCRIPTION - Continued

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-157 AASSN:

ROCK NAME: Micaceous Quartz Wacke

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Chlorite	1	Flakes of various size & shape.	Appears to be wholly detrital.	
Muscovite	4	Flakes of various size & shape.	Some contortion of larger flakes due to sediment compaction.	Some iron oxide development along cleavage traces.
Zircon	<1	Fine sand to coarse silt sized; subrounded.	Mostly concentrated in h.m. layers; also disseminated throughout sample.	
Tourmaline	<1	Fine sand to coarse silt sized; subrounded.	Mostly concentrated in heavy mineral layers; also disseminated throughout sample.	
Sphene & Rutile	<1	Fine sand to coarse silt sized; subrounded.	Mostly concentrated in heavy mineral layers; also disseminated throughout sample.	Abundant leucoxene development.
Apatite	<1	Fine sand to coarse silt sized; subangular to subrounded.	Much more abundant in this sample than in preceding 4 samples; mostly concentrated in heavy mineral layer; also disseminated throughout sample.	
Opauques	3	Various shapes & forms.	Hematite, limonite, ilmenite, and some magnetite; most ilmenite shows hematite exsolution.	

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport 12-78-7443 REQUEST: 101703

FIELD NO: MHK-163 AASSN:

ROCK NAME: Micaceous Quartz Wacke

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES: Floating, point, and straight grain common; no primary U mineral found, only secondaries; present porosity estimated to be approximately 1%.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	67	Mostly very fine sand sized; subangular.	Mostly single grain variety; some polycrystalline (metamorphic) grains are present; various inclusions present; a few heavily rutilated grains present.	Trace of secondary quartz overgrowths which appear to be predepositional.
Metamorphic Rock Fragments	3	Fine to very fine sand sized; elongate; subrounded.	Fine grained micaceous quartz schists & phyllites; breaking down to form matrix; at times they are difficult to distinguish from matrix.	
Matrix	12		Clayey & micaceous; derived from breakdown of unstable rock fragments.	
Plagioclase	1	Very fine sand to coarse silt sized; subangular.	No compositional determination made; some could be part of rock fragments; some inclusions observed.	Relatively fresh in appearance.
K-feldspar	1	Very fine sand sized; subangular.	Microcline & orthoclase; various inclusions observed.	Relatively fresh in appearance.
Muscovite	5	Flakes of various size & shape.	Some contortion due to sediment compaction; some are perpendicular to bedding plane (authigenic?)	Some iron oxide development along cleavage traces.

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport 12-78-7443

REQUEST: 101703

FIELD NO: MHK-163

AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Biotite	2	Flakes of various size & shape.	Some contortion due to sediment compaction.	Various degrees of alteration; heavy iron oxide development in some.
Chlorite	4	Flakes of various size & shape.	Some contortion due to sediment compaction; some authigenic(?).	
Chert	<1	Very fine sand sized.	Typical microcrystalline texture.	Abundant leucoxene development.
Zircon	<1	Mostly coarse silt sized; subrounded.	Disseminated throughout sample.	
Tourmaline	<1	Coarse silt sized; subrounded.	Disseminated throughout sample.	
Sphene	<1	Coarse silt sized; subrounded.	Disseminated throughout sample.	
Apatite	<1	Coarse silt sized; subrounded.	Disseminated throughout sample.	
Opagues	2		Cu-S minerals carbonaceous matter, and leucoxene; trace hematite present.	
Secondary U Minerals	tr		Troegerite & zippeite (see photos).	

OTHER COMMENTS:

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport 12-78-7443 REQUEST: 101703

FIELD NO: MHK-164 AASSN:

ROCK NAME: Calcareous Micaceous Quartz Arenite

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES: Present porosity estimated to be approximately 1%; concave/convex and point contacts common.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	59	Fine to medium sand sized; subangular to subrounded.	Mostly single grain variety; some polycrystalline (metamorphic) varieties are present; some grains are heavily rutilated; other inclusions also observed.	Trace amounts of secondary quartz overgrowths.
K-feldspar	1	Fine to medium sand sized; subrounded.	Microcline & orthoclase; a few authigenic K-feldspar overgrowths observed; various inclusions.	Minor alteration; some replacement by calcite.
Plagioclase	1	Fine to medium sand sized; subrounded.	Some plagioclase appears as though it is part of rock fragments; relationships too obscure to be positive.	Minor alteration; some replacement by calcite.
Chert	<1	Fine to medium sand sized; subrounded.	Typical microcrystalline texture.	
Metamorphic Rock Fragments	5	Elongate; fine to medium sand sized; subrounded.	Micaceous quartz schists & phyllites; breaking down to form matrix.	
Calcite Cement	11		Sparitic; some large well-developed crystals cementing large areas; replaces feldspars to a minor extent.	
Barite Cement	<1		Patchy; in small areas.	

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport 12-78-7443 REQUEST: 101703 FIELD NO: MHK-164 AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Muscovite	5	Flakes of various size & shape.	Larger flakes are contorted due to sediment compaction.	Some iron oxide development along cleavage traces.
Chlorite	3	Flakes of various size & shape.	Some contortion due to sediment compaction; some intergrown with muscovite; some authigenic.	Iron oxides frequently associated.
Biotite	1	Flakes of various size & shape.	Some contortion due to sediment.	Various degrees of alteration.
Zircon	<1	Fine sand to coarse silt sized; subrounded.	Disseminated throughout sample.	
Tourmaline	<1	Fine sand to coarse silt sized; subangular to subrounded.	Disseminated throughout sample.	
Sphene/Rutile	<1	Very fine sand to coarse silt sized; subangular to subrounded.	Disseminated throughout sample.	Abundant leucoxene development.
Apatite	<1	Very fine sand to coarse silt sized; subangular.	Disseminated throughout sample.	
Opaques	7	Various shapes & forms.	Cu-S minerals, Cu-As mineral, CO-As mineral, uraninite, and an unidentified Zn mineral (see photos); hematite, limonite, leucoxene also present; some hematitic cement; carbonaceous matter also present.	

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OTHER COMMENTS:

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport 12-78-7443 REQUEST: 101703 FIELD NO: MHK-164 AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Matrix	4		Micaceous & clayey; derived from breakdown of unstable rock fragments.	
Secondary U Minerals	tr		Zellerite(?) - see photo.	

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OTHER COMMENTS:

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport 12-78-7443 REQUEST: 101703

FIELD NO: MHK-198 AASSN:

ROCK NAME: Lithic Arenite

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES: Present porosity estimated to be approximately 17%; point & straight contacts predominate; alpha-tracking revealed no significant source of radioactivity.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	67	Medium to coarse sand sized; subangular to subrounded.	Mostly single grain variety; some polycrystalline & metamorphic types present; various inclusions present; abundant rutile in some.	Secondary quartz overgrowths observed.
Metamorphic Rock Fragments	4	Elongate; subrounded; medium sand sized.	Fine grained schists/ gneisses.	
Sedimentary Rock Fragments	5	Elongate; subrounded; medium sand sized.	Siliceous siltstones & mudstones.	
Malachite	7		As a cement & void space filling; all secondary.	
Chert	2	Subrounded; medium to coarse sand sized.	Typical microcrystalline texture.	
Plagioclase	1	Subrounded; medium sand sized.	Fairly fresh; few inclusions.	
K-feldspar	1	Subrounded; medium sand sized.	Microcline & orthoclase; also fairly fresh & inclusion free.	
Muscovite	1	Flakes of various size & shape.	Disseminated; some contortion due to compaction.	
Biotite	1	Flakes of various size & shape.	Disseminated; some contortion due to compaction.	

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PETROGRAPHIC DESCRIPTION -- Continued

PROJECT: Williamsport 12-78-7443

REQUEST: 101703

FIELD NO: MHK-198 AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Chlorite	<1	Flakes of various size & shape.	Disseminated.	
Tourmaline	<1	Fine sand sized; subrounded.	Disseminated in sample.	
Zircon	<1	Fine sand sized; subrounded.	Disseminated in sample.	
Matrix	2		Derived from unstable rock fragments.	
Opakes	5	Various forms.	Mostly organic matter; some pyrite & chalcopryite, limonite, and leucoxene.	
Plutonic Rock Fragments	1	Subangular; medium to coarse sand sized.	"Granitic" composition.	
Monazite	<1	Fine sand sized; subrounded.	One detrital grain identified using SEM/EDS.	

OTHER COMMENTS:

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: M'K-199 AASSN:

ROCK NAME: Micaceous Quartz Wacke

PETROLOGIST:

GENERAL TEXTURE AND FEATURES: Point & straight grain contacts are most common for non-micaceous minerals; some concave/convex contacts; present porosity <1%.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	72	Fine to very fine sand sized; mostly subangular.	Mostly single grain variety; some polycrystalline grains observed.	Trace of secondary overgrowths.
Chert	<1	Fine sand sized; subrounded.	Typical microcrystalline texture.	
Matrix	11		Micaceous & clayey; derived from breakdown of unstable rock fragments.	
Plagioclase	<1	Fine to very fine sand sized; subangular to subrounded.	No accurate compositional determination could be made; a few could be part of rock fragments but positive distinction could not be made.	Minor alteration.
K-feldspar	<1	Fine to very fine sand sized; subangular to subrounded.	Microcline & orthoclase; a few could be part of rock fragments but positive distinction could not be made.	Minor alteration.
Metamorphic Rock Fragments	5	Fine sand sized; subrounded features.	Fine grained micaceous schists & phyllites; breaking down to form matrix.	

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-199

AASSN:

<u>MINERAL/COMPONENT</u>	<u>%</u>	<u>TEXTURE</u>	<u>CHARACTERISTICS</u>	<u>ALTERATION/REPLACEMENT</u>
Muscovite	4	Flakes of various size & shape.	Some bending & contortion due to sediment compaction.	
Biotite	1	Flakes of various size & shape.	Some bending & contortion due to sediment compaction.	
Chlorite	2	Flakes of various size & shape.	Some bending & contortion due to sediment compaction.	
Calcite Cement	2		Sparitic; in small isolated areas only.	
Tourmaline	<1	Very fine sand sized; subangular to subrounded.	Blue, green, and brown varieties present; disseminated throughout sample.	
Zircon	<1	Very fine sand sized; subangular to subrounded.	Disseminated throughout sample.	
Apatite	<1	Very fine sand sized; subangular to subrounded.	Disseminated throughout sample.	
Sphene/Rutile	<1	Very fine sand sized; subangular to subrounded.	Disseminated throughout sample.	
Opagues	<1		Reflected light microscopy revealed only leucoxene.	

OTHER COMMENTS:

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-200 AASSN:

ROCK NAME: Quartz Arenite

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES: Various grain contacts observed; present porosity approximately 1%.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	76	Fine to very fine sand sized; subangular to subrounded.	Mostly single grain variety; some polycrystalline varieties observed; a few grains are heavily rutilated; various other inclusions observed.	Secondary quartz overgrowths delineated by dust rings are fairly common.
Chert	<1	Very fine sand sized; subrounded.	Typical microcrystalline texture.	
Matrix	5		Micaceous & clayey; derived from unstable rock fragments.	
Muscovite	3	Flakes of various size & shape.	Bent and contorted due to sediment compaction.	
Chlorite	1	Flakes of various size & shape.	Some authigenic (?); bent & contorted due to sediment compaction.	
Biotite	<1	Flakes of various size & shape.	Bent & contorted due to sediment compaction.	Some iron oxide development along cleavage traces,
Calcite Cement	5		Sparitic.	
Plagioclase	<1	Mostly very fine sand sized; subangular.	No accurate compositional determination could be made; some is possibly part of rock fragments.	Trace alteration.

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-200 AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
K-feldspar	<1	Very fine sand sized; subangular.	Microcline & orthoclase; some could be part of rock fragments.	Trace alteration.
Metamorphic Rock Fragments	4	Fine to very fine sand sized; subrounded; elongate.	Fine grained micaceous schists & phyllites; breaking down to form matrix.	
Zircon	<1	Very fine sand to coarse silt sized; subangular to sub- rounded.	Disseminated throughout sample.	
Tourmaline	<1	Very fine to coarse silt sized; subangular to subrounded.	Disseminated throughout sample.	
Sphene/Rutile	<1	Very fine sand to coarse silt sized; subangular to subrounded.	Disseminated throughout sample.	Abundant leucoxene development.
Apatite	<1	Very fine sand to coarse silt sized; subangular.	Disseminated throughout sample.	
Barite Cement	<1		Patchy; very small areal extent.	
Opagues	3	Various shapes and forms.	Limonite stain abundant; some magnetite, ilmenite, & limonite grains.	

OTHER COMMENTS:

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport 12-78-7443 REQUEST: 102332

FIELD NO: MHK-201 AASSN:

ROCK NAME: Lithic Wacke

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES: Approximately 3% pore space by point count; alpha tracking revealed no significant source of radioactivity.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	66	Very fine to medium sand sized; some concave/convex contacts; subangular to subrounded.	Single, polycrystalline, recrystallized metamorphic stretched metamorphic, and vein quartz with vermicular chlorite inclusions present; a few are rutilated.	Trace amounts of secondary quartz overgrowths; probably a result of pressure solution.
Matrix	12		Micaceous; derived from breakdown of metamorphic RF's; difficult to establish where rock fragments end & matrix begins.	
Metamorphic RF's	9	Fine to medium sand sized; elongate with subrounded features.	Phyllites & very fine grained schists; forming "matrix".	
Muscovite	4	Flakes of various size & shape.	Compaction contortion common; disseminated detrital flakes.	
Garnet	< 1	Very fine sand sized; angular.	As broken disseminated detrital grains.	
Zircon	< 1	Silt to very fine sand sized; subangular to subrounded.	As inclusions & disseminated detrital grains.	
Tourmaline	< 1	Very fine to fine sand sized; subangular to subrounded.	As inclusions & disseminated detrital grains.	

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport 12-78-7443

REQUEST: 102332

FIELD NO: MHK-201

AASSN:

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MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Chlorite	1	Flakes of various size & shape	Compaction deformation common; disseminated detrital flakes.	
Biotite	1	Flakes of various size & shape	Compaction deformation common; disseminated detrital flakes.	
Rutile	<1	Silt to very fine sand sized; subangular.	As inclusions & disseminated detrital grains.	
Plagioclase	1	Fine to medium sand sized; subangular to subrounded.	Slightly deformed twin lamellae observed; abundant micas in some; could be part of rock fragments.	Trace to minor alteration overall.
Apatite	tr	Fine to very fine sand sized; subangular to subrounded.	As inclusions & disseminated detrital grains.	
K-feldspar	<1	Fine to medium sand sized; subangular to subrounded.	Orthoclase; could be part of rock fragments; positive distinction not possible.	Trace alteration.
Allanite	tr	Fine sand sized; subangular.	One detrital grain observed.	
Malachite	<1		As local cement; patchy.	
Chert	<1	Fine to medium sand sized; subrounded.	Typical microcrystalline grains.	
Opagues	3	Various forms.	Carbonaceous matter, leucoxene coated grains, hematite, limonite, and trace pyrite, chalcopyrite.	

OTHER COMMENTS:

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-223 AASSN:

ROCK NAME: Quartz Arenite

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES: Present porosity is estimated to be <1%; point & straight contacts for non-micaceous minerals dominate but concave/convex contacts also present.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	65	Mostly fine sand sized; both larger & smaller grains present; mostly subangular features.	Mostly single grain variety; a few polycrystalline grains present; various inclusions observed.	Trace of secondary quartz overgrowths.
Plagioclase	2	Mostly fine sand sized; subangular features.	No accurate compositional determination could be made; a few could be part of rock fragments but positive distinction could not be made.	Minor amounts of alteration.
K-feldspar	2	Mostly fine sand sized; subangular features.	Microcline & orthoclase; a few could be part of rock fragments but positive distinction could not be made.	Minor amounts of alteration.
Matrix	5		Clayey & micaceous; derived from breakdown of unstable rock fragments.	
Chert	2	Fine sand sized; subrounded.	Typical microcrystalline texture.	
Metamorphic Rock Fragments	4	Fine sand sized; subrounded features.	Fine grained micaceous schists & phyllites; breaking down to form matrix.	
Muscovite	2	Flakes of various size & shape.	Some bending & contortion due to sediment composition.	

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-223 AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Chlorite	3	Flakes of various size & shape.	Some bending & contortion due to sediment compaction; some authigenic(?).	
Biotite	1	Flakes of various size & shape.	Some bending & contortion due to sediment compaction.	
Zircon	3	Fine to very fine sand sized; subangular to subrounded.	Mostly concentrated in heavy mineral layers, but also disseminated.	
Tourmaline	2	Fine to very fine sand sized; subangular to subrounded.	Mostly concentrated in heavy mineral layers, but also disseminated.	
Sphene/Rutile	1	Fine to very fine sand sized; subangular to subrounded.	Mostly concentrated in heavy mineral layers but also disseminated.	Abundant leucoxene development.
Apatite	<1	Fine to very fine sand sized; subrounded to subangular.	Mostly concentrated in heavy mineral layers, but also disseminated.	
Opagues	7	Various shapes & forms.	Ilmenite, limonite (stains & grains). Ilmenite concentrated along heavy mineral layers.	

OTHER COMMENTS:

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-226 AASSN:

ROCK NAME: Quartz Arenite

PETROLOGIST:

GENERAL TEXTURE AND FEATURES: Concave/convex grain contacts predminate; present porosity approximately 1%.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	79	Mostly fine sand sized; some smaller and larger grains are present; probably subangular to subrounded before effects of pressure solution.	Mostly single grain variety; grain contacts prohibit positive identification of polycrystalline forms; heavily rutilated.	Trace amounts of overgrowths delineated by dust rings were observed; suspect that more is present due to pressure solution, but it is not obvious.
Plagioclase	2	Fine sand sized; probably subangular to subrounded before effects of pressure solution.	Identified as andesine by Michel-Levy's method; some could possible be part of rock fragments but distinction can't be made.	Trace to minor alteration.
K-feldspar	2	Fine sand sized; probably subangular to subrounded before effects of pressure solution.	Microcline & orthoclase; some could be part of rock fragments but positive distinction can't be made.	Trace to minor alteration.
Matrix	3		Micaceous; derived from breakdown of unstable rock fragments.	
Chert	2	Fine sand sized; probably subrounded before effects of pressure solution.	Typical microcrystalline texture.	
Biotite	1	Flakes of various size & shape.	Often bent & contorted due to sediment compaction.	
Muscovite	2	Flakes of various size & shape.	Most is bent & contorted due to sediment compaction; long, straight flakes might be authigenic.	

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-226

AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Chlorite	3	Flakes of various size & shape.	Often bent & contorted due to sediment compaction.	
Metamorphic Rock Fragments	3	Mostly fine sand sized; elongate; subrounded features.	Micaceous schists & phyllites; breaking down to form matrix.	
Zircon	<1	Subangular to subrounded; very fine sand sized.	Disseminated throughout sample.	
Tourmaline	<1	Subangular to subrounded; very fine sand sized.	Blue, green, and brown varieties; disseminated throughout sample.	
Sphene/Rutile	<1	Subangular to subrounded; very fine sand sized.	Disseminated throughout sample.	
Apatite	<1	Subangular; very fine sand sized.	Disseminated throughout sample.	
Opaques	1		Reflected light microscopy revealed only leucoxene; some carbonaceous matter.	

OTHER COMMENTS:

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-241 AASSN:

ROCK NAME: Lithic Arenite

PETROLOGIST: RSW

GENERAL TEXTURE AND FEATURES: Present porosity estimated to be less than 1%.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	25	Fine to medium sand sized; subangular to subrounded.	Mostly single grain variety; some polycrystalline (metamorphic) forms also present; some heavily rutilated.	
Calcite Cement	18		Sparitic; some well-developed large crystals cementing larger areas; replaces some feldspars.	
Barite Cement	<1		Patchy; in small areas only.	
Sedimentary Rock Fragments	46	Sizes up to 6mm.; rounded features.	Large carbonate clasts; some detritus in some clasts; calcite recrystallization in some; iron oxides commonly associated; a few siltstone & mudstone clasts.	
Metamorphic Rock Fragments	2	Fine to medium sand sized; elongate; subrounded.	Micaceous quartz schists & phyllites.	
Plagioclase	<1	Fine sand sized; subangular to subrounded.	Some inclusions present; no composition determined.	Some replacement by calcite; minor amounts of alteration.
K-feldspar	<1	Fine sand sized; subangular to subrounded.	Microcline & orthoclase; some inclusions present.	Some replacement by calcite; minor amounts of alteration.

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PETROGRAPHIC DESCRIPTION — Continued

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-241 AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Biotite	1	Flakes of various size & shape.	Slight contortion due to sediment compaction; iron oxide association.	Various degrees of alteration.
Muscovite	2	Flakes of various size & shape.	Slight contortion due to sediment compaction.	Some iron oxide development along cleavage traces.
Chlorite	1	Flakes of various size & shape.	Slight contortion due to sediment compaction.	
Chert	<1	Fine sand sized; subangular to subrounded.	Typical microcrystalline texture.	
Zircon	<1	Very fine sand to coarse silt sized; subrounded.	Disseminated in sample.	
Tourmaline	<1	Very fine sand to coarse silt sized; subrounded.	Disseminated in sample.	
Sphene/Rutile	<1	Very fine sand to coarse silt sized; subrounded.	Disseminated in sample.	
Opagues	2		Limonite, carbonaceous matter; trace of magnetite.	

OTHER COMMENTS:

PETROGRAPHIC DESCRIPTION

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-983 AASSN:

PETROLOGIST: RSW

ROCK NAME: Quartz Arenite

GENERAL TEXTURE AND FEATURES: Concave/convex grain contacts predominate; present porosity estimated to be approximately 1%.

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Quartz	84	Mostly fine sand sized; larger & smaller grains are also present; grains were probably subangular to subrounded before effects of pressure solution.	Mostly single grain variety present; grain contacts prohibit identification of most polycrystalline forms; some are heavily rutilated; vermicular chlorite inclusions also frequently observed.	Trace amounts of overgrowths delineated by dust rings observed; suspect that more is present due to pressure solution, but it is not obvious.
Plagioclase	2	Mostly fine sand sized; probably were subangular to subrounded before effects of pressure solution.	Determined to be andesine by Michel-Levy's method; a few inclusions are present; some could be part of rock fragments but it is difficult to distinguish.	Relatively fresh; only trace amounts of alteration observed.
K-feldspar	1	Mostly fine sand sized; probably were subangular to subrounded before effects of pressure solution.	Microcline and orthoclase; some could also be part rock fragments but it is difficult to be certain.	Trace amounts of alteration.
Matrix	2		Micaceous; derived from breakdown of unstable rock fragments; often difficult to establish boundary between matrix and rock fragment.	
Chert	1	Fine sand sized; probably were subangular to subrounded before pressure solution.	Typical microcrystalline texture.	

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PETROGRAPHIC DESCRIPTION -- Continued

PROJECT: Williamsport
12-78-7443

REQUEST: 101703

FIELD NO: MHK-983

AASSN:

MINERAL/COMPONENT	%	TEXTURE	CHARACTERISTICS	ALTERATION/REPLACEMENT
Metamorphic Rock Fragments	3	Fine sand sized; elongate; subrounded features.	Micaceous schists and phyllites; breaking down to form matrix.	
Chlorite	1	Flakes of various size & shape.	Often bent & contorted due to sediment compaction.	
Biotite	<1	Flakes of various size & shape.	Often bent & contorted due to sediment compaction.	Minor amounts of alteration.
Muscovite	3	Flakes of various size & shape.	Often bent & contorted due to sediment compaction.	
Tourmaline	<1	Mostly very fine sand sized; subangular to subrounded.	Blue, green, and brown varieties observed; disseminated throughout sample.	
Zircon	<1	Very fine sand to coarse silt sized; subangular to subrounded.	Disseminated throughout sample.	
Sphene/Rutile	<1	Very fine sand to coarse silt sized; subangular to subrounded.	Disseminated throughout sample.	Abundant leucoxene development.
Apatite	<1	Fine to very fine sand sized; subangular.	Disseminated throughout sample.	
Opauques	<1	Various shapes & forms.	Pyrite(?); too small to determine optically.	
Malachite	<1		As secondary cement (only observed in polished thin section).	

OTHER COMMENTS: